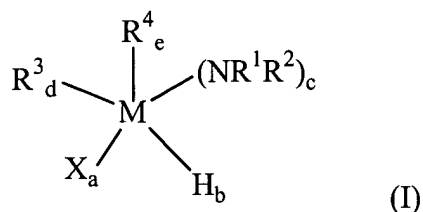


What is claimed is:

1. A method of depositing a metal-containing film on a substrate comprising the steps of: a) conveying one or more of the organometallic compounds of formula I in a gaseous phase to a deposition chamber containing the substrate,



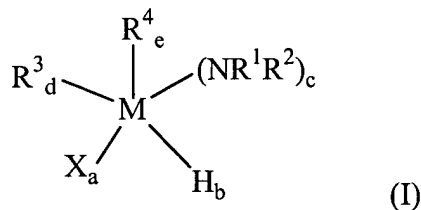
wherein M is Si or Ge;  $R^1$  and  $R^2$  are independently chosen from H, alkyl, alkenyl, alkynyl and aryl; each  $R^3$  is independently chosen from  $(C_1-C_{12})$ alkyl, alkenyl, alkynyl and aryl, provided that  $R^3$  is not cyclopentadienyl; each  $R^4$  is independently chosen from  $(C_3-C_{12})$ alkyl; X is halogen;  $a = 0-3$ ;  $b = 0-3$ ;  $c = 0-3$ ;  $d = 0-2$ ;  $e = 0-4$ ; and  $a + b + c + d + e = 4$ ; wherein  $R^3 \neq R^4$ ; wherein the sums of  $a + b$  and  $a + d$  are each  $\leq 3$ ; provided that when  $M = Si$  the sum of  $b + c$  is  $\leq 3$ ; b) decomposing the one or more organometallic compounds in the deposition chamber; and c) depositing the metal film on the substrate.

2. The method of claim 1 wherein  $M = Ge$ .

3. The method of claim 2 wherein  $d = 1-2$  and  $e = 1-3$ .

4. The method of claim 1 wherein  $R^4$  is branched or cyclic  $(C_3-C_{12})$ alkyl.

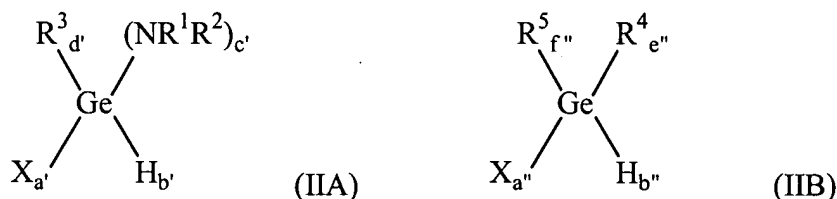
5. A device for feeding a fluid stream saturated with an organometallic compound suitable for depositing a metal film containing silicon, germanium and combinations thereof to a chemical vapor deposition system including a vessel having an elongated cylindrical shaped portion having an inner surface having a cross-section, a top closure portion and a bottom closure portion, the top closure portion having an inlet opening for the introduction of a carrier gas and an outlet opening, the elongated cylindrical shaped portion having a chamber containing an organometallic compound of formula I



wherein M is Si or Ge;  $R^1$  and  $R^2$  are independently chosen from H, alkyl, alkenyl, alkynyl and aryl; each  $R^3$  is independently chosen from  $(C_1-C_{12})$ alkyl, alkenyl, alkynyl and aryl, provided that  $R^3$  is not cyclopentadienyl; each  $R^4$  is independently chosen from  $(C_3-C_{12})$ alkyl; X is halogen;  $a = 0-3$ ;  $b = 0-3$ ;  $c = 0-3$ ;  $d = 0-2$ ;  $e = 0-4$ ; and  $a + b + c + d + e = 4$ ; wherein  $R^3 \neq R^4$ ; wherein the sums of  $a + b$  and  $a + d$  are each  $\leq 3$ ; provided that when  $M = Si$  the sum of  $b + c$  is  $\leq 3$ ; the inlet opening being in fluid communication with the chamber and the chamber being in fluid communication with the outlet opening.

6. An apparatus for vapor deposition of metal films comprising one or more devices of claim 5.

7. A compound of formula IIA or IIB:



wherein  $R^1$  and  $R^2$  are independently chosen from alkyl, alkenyl, alkynyl or aryl; each  $R^3$  is independently chosen from  $(C_1-C_{12})$ alkyl, alkenyl, alkynyl and aryl; each  $R^4$  is independently chosen from branched and cyclic  $(C_3-C_5)$ alkyl; each  $R^5$  is independently chosen from  $(C_1-C_{12})$ alkyl, alkenyl, alkynyl and aryl; X is halogen;  $a' = 0-3$ ;  $b' = 0-2$ ;  $c' = 1-3$ ;  $d' = 0-3$ ;  $a' + b' + c' + d' = 4$ ;  $a'' = 0-2$ ;  $b'' = 0-2$ ;  $e'' = 1-2$ ;  $f'' = 0-2$ ;  $a'' + b'' + e'' + f'' = 4$ ; wherein at least two of  $a''$ ,  $b''$  and  $f'' \neq 0$ ; provided when  $a'' = 1$ ,  $e'' = 1$ ,  $f'' = 2$ , and  $R^4 = (CH_3)C$  that  $R^5 \neq CH_3$ ; and provided that  $R^3$  is branched or cyclic  $(C_3-C_5)$ alkyl when  $c' + d' = 4$ .

8. The compound of claim 7 wherein  $R^3$  is branched or cyclic  $(C_3-C_5)$ alkyl.

9. The compound of claim 7 wherein  $e'' = 1-2$ ;  $f'' = 1-2$ ; and  $b'' = 1-2$ .

10. The compound of claim 7 wherein  $d' = 1-3$  and  $b' = 1-2$ .

11. A method of depositing a metal film on a substrate comprising the steps of: a) conveying the organometallic compound of claim 7 in a gaseous phase to a deposition chamber containing the substrate; b) decomposing the organometallic compound in the deposition chamber; and c) depositing the metal film on the substrate.